Twisted Pair Cable

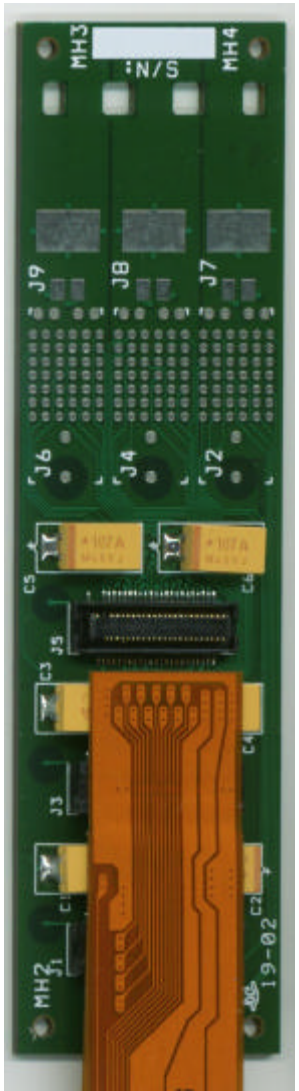
A.Nomerotski 12/12/02

- Dense assembly (OD 5-7 mm) with
  - Twisted pairs : total 21; 44-pin 0.625 mm dual row Omnetics connector
    - differential signals
    - single-ended signals
    - Temperature, voltage sensing, spares
    - Common shield
    - Connectors can be purchased terminated with twisted pairs
  - Power and HV lines
  - Clock mini-coaxial cables
- Round cross section – easy to route between Junction Cards and Adapter Cards

Junction Card

Hybrid - Jumper Cable - **Junction Card** - Twisted Pair Cable – Adapter Card

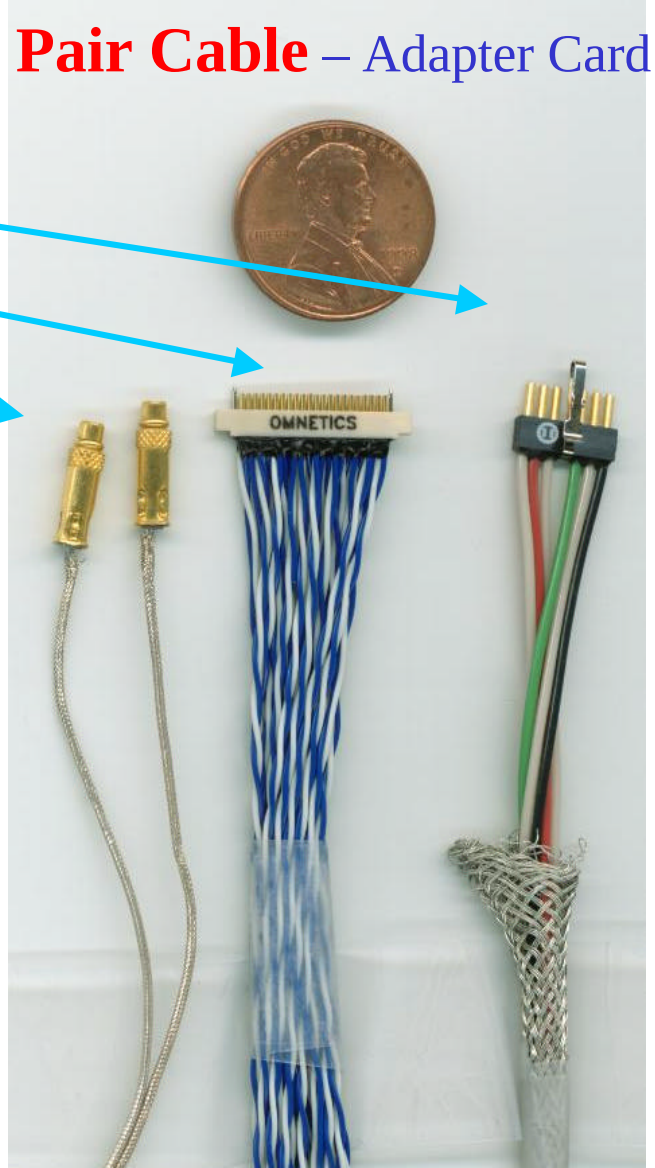
- **L0-1 : 3 hybrids → junction card**
  L2-5 : 2 hybrids → junction card
- **50-pin AVX connectors,**
- **Twisted pairs are soldered to JC, cards are extensions of cable bundles**
- **Dimensions 97 (70) mm x 25 mm**
- **Location : near present H-disks**
- **Designed by Kansas State**
- **Prototypes received in May 2002**



Twisted Pair Cable

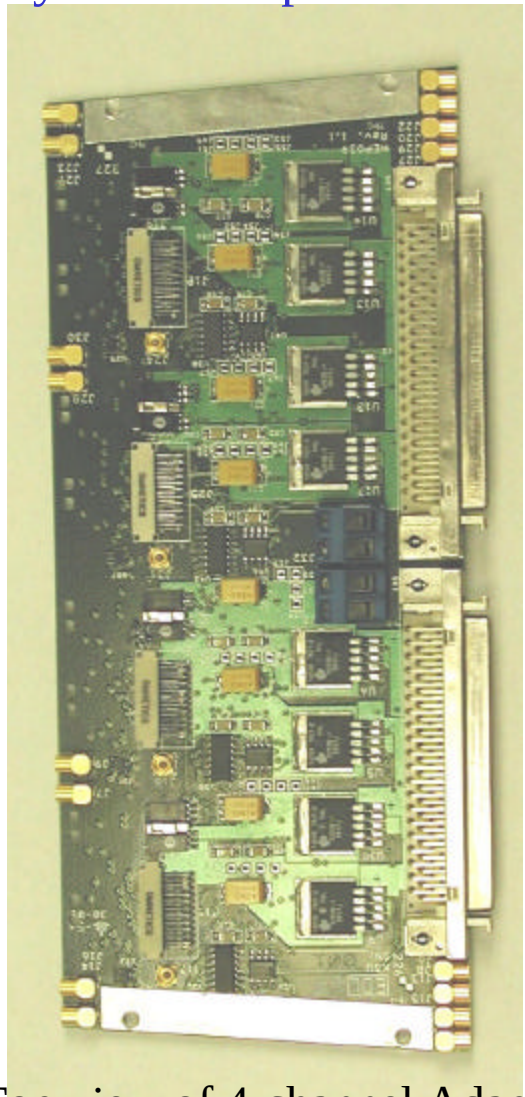
Hybrid - Jumper Cable - Junction Card - **Twisted Pair Cable** – Adapter Card

- **Consists of**
  - **Power & HV lines : 6-pin Omnetics connector**
  - **Signal pairs : 44-pin Omnetics connector**
  - **Clock coaxes**
- **Designed by Fermilab**
- **All parts (connectors, pairs) received for prototype cables**
- **Prototypes ready**



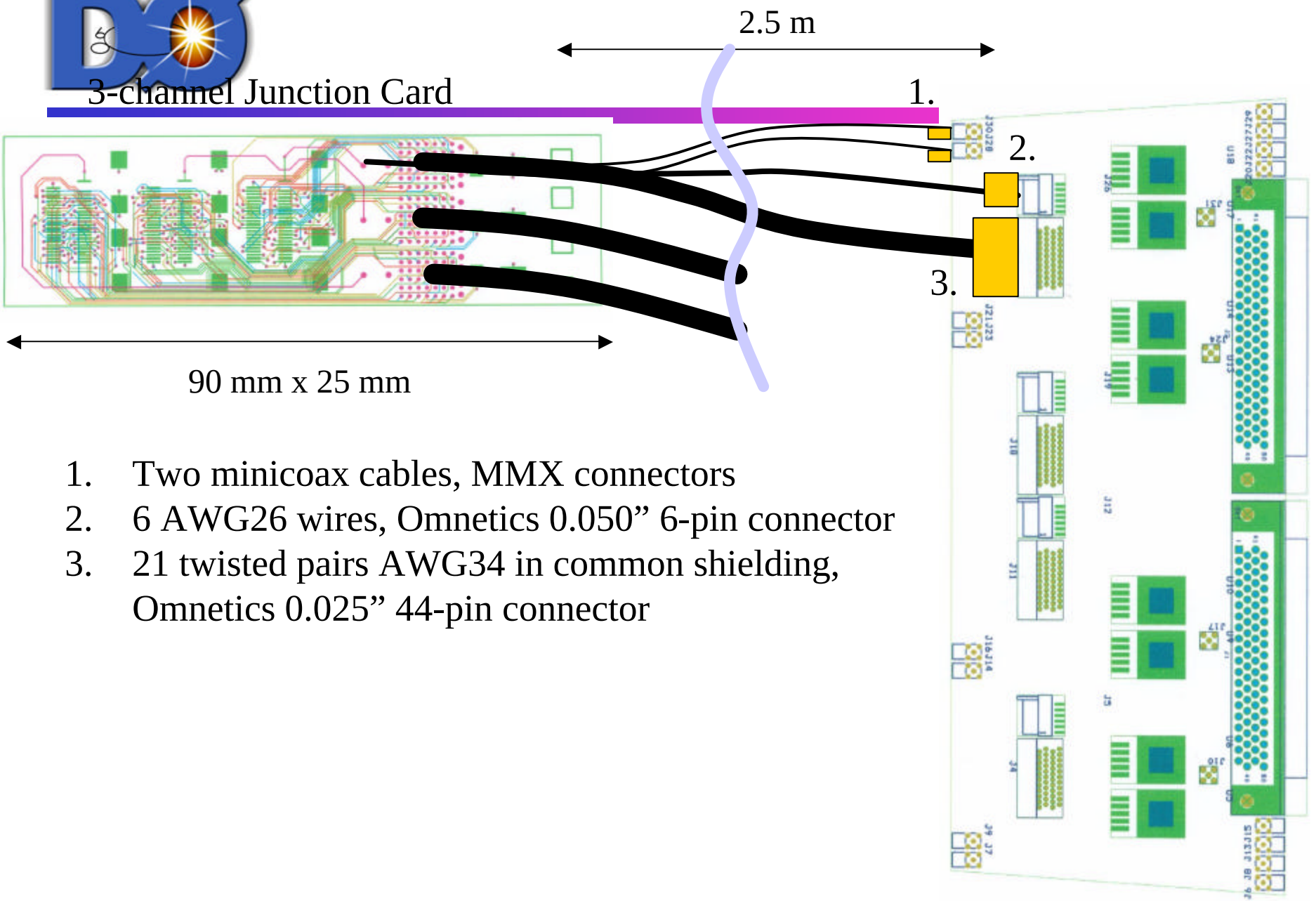
Adapter Card

Hybrid - Jumper Cable - Junction Card - Twisted Pair Cable – **Adapter Card**



Top view of 4-channel Adapter Card

- **Adapter Card is active :**
  - **Two voltage regulators per hybrid: analog and digital voltages**
  - **Differential-to-Single-Ended 2.5-to-5 V translation for SVX4 Data**
  - **5-to-2.5 V translation for SVX4 Controls**
  - **Routing of Clock and HV**
- **Four rings of Adapter Cards at two ends of calorimeter**
- **Designed by Kansas State**
- **Several iterations on design**
- **Prototypes ready**

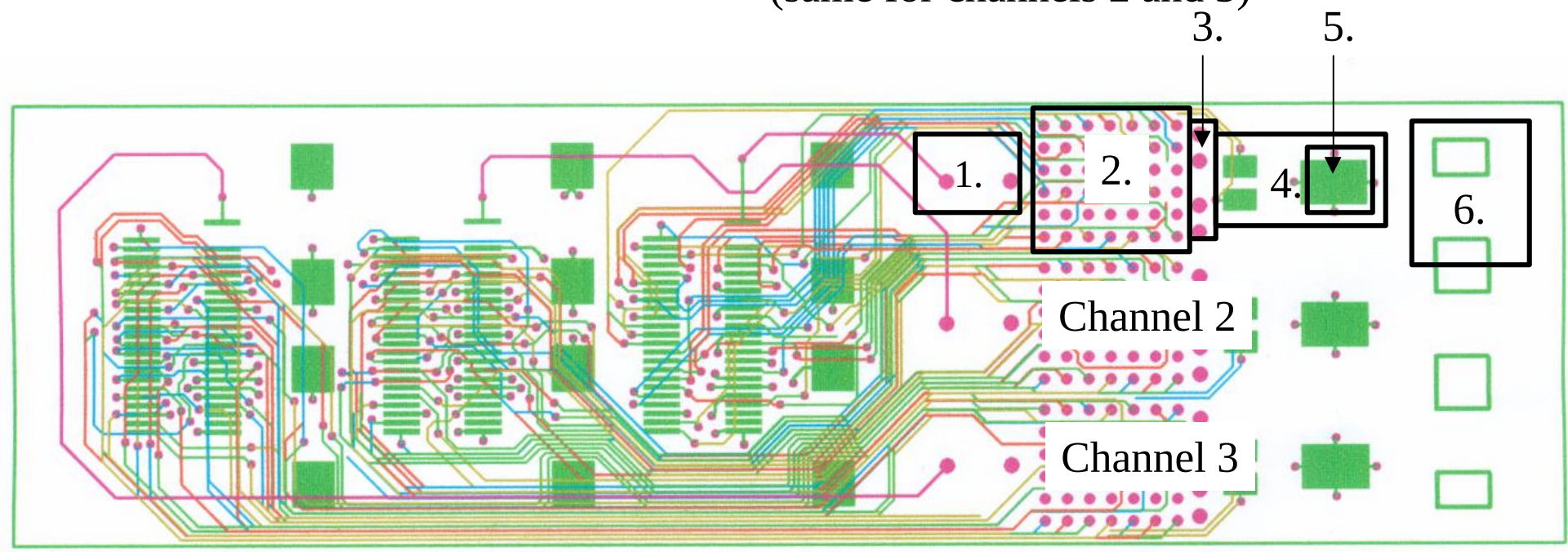


1. Two minicoax cables, MMX connectors
2. 6 AWG26 wires, Omnetics 0.050” 6-pin connector
3. 21 twisted pairs AWG34 in common shielding, Omnetics 0.025” 44-pin connector

Channel 1

1. AWG26 HV field
2. AWG34 pair field
3. AWG26 LV field
4. Submini coax field
5. Common shielding field
6. Restrain field

(same for channels 2 and 3)



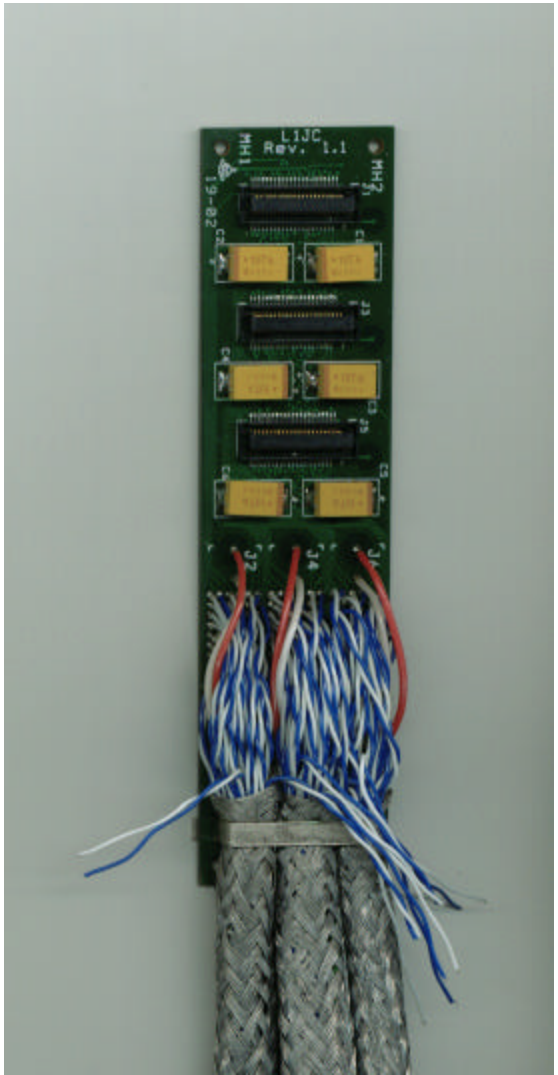
90 mm x 25 mm

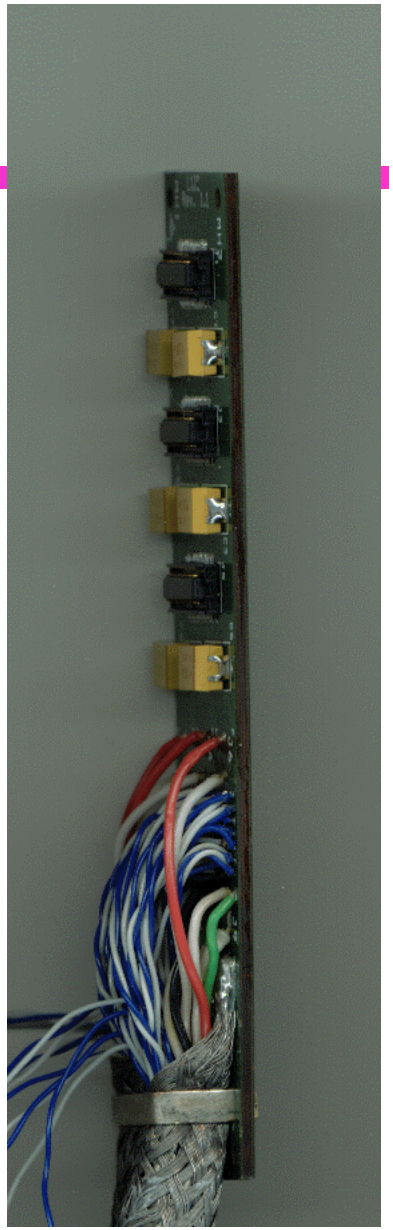
Twisted Pair Cable

- **Status**
  - Received all parts in August
    - (Almost) same design for signal part as CDF
  - Have 3 assemblies
    - Fermilab : one channel (B.Jones) – used for full chain tests
    - KSU : one channel – used for full chain tests
    - BINP Novosibirsk : 3 channels – vendor qualification, will be used at 1% stand
  - Discussing with CDF next prototype of signal cable
    - 27 twisted pairs : enough for 4 doubles for single ended signals
  - How to proceed with cable assembly?
    - Options : solder signal cable at Junction Card or have a connector ?
    - Need EE or ET to help with design

Twisted Pair Cable

- **BINP Novosibirsk assembly**
  - Admitted difficulties
  - Looks ok
  - Needs testing



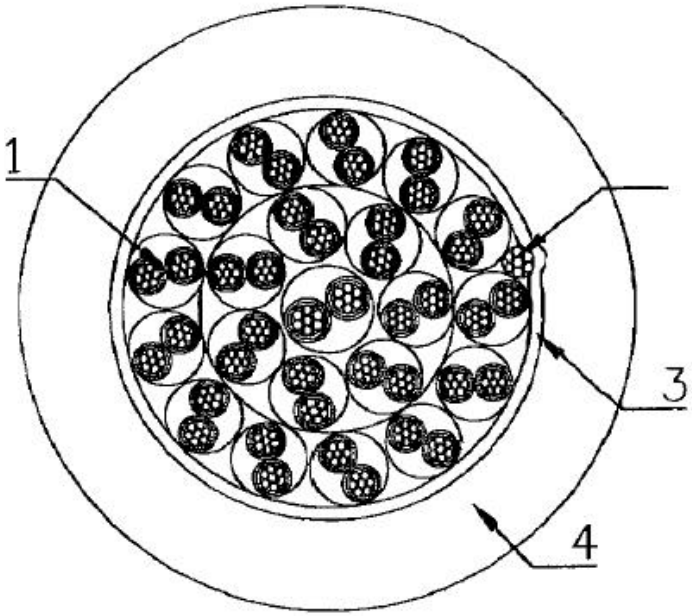


CDF twisted pait cable

- **CDF designed TPC (Wayne State responsible)**

Table 2. Signal Cable Characteristics

Number of twisted pairs	24
Wire conductor	34 AWG, strand
Total radiation dose	5 Mrad
Maximum overall diameter	< 4.5 mm
Voltage rating	50 V
Temperature rating	-10 to 100°C
Drain wire	34 AWG, strand, laid parallel under shield
Shielding thickness	> 200 µm
Length (total)	3000 to 4000 feet



1. Twisted pair
2. Drain wire
3. Shielding
4. Insulation

Figure 4. Sketch of the Signal Cable